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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 05182004

Application Number: 09/851,274
Filing Date: May 08, 2001
Appellant(s): KUBOTA ET AL.

Shawna Cannon Lemon
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed on January 16, 2004.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is deficient because it does not summarize the gist of the invention. That is, the summary does not mention a resist material characterized by having a surfactant with a fluorine substituent as well as a non-ionic surfactant containing neither a fluorine substituent nor a silicon-containing substituent.

(6) Issues

The appellant's statement of the issues in the brief is correct.

(7) Grouping of Claims

Appellant's brief includes a statement that the claims 1-4 and 9-20 stand or fall together.

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

6,159,656	KAWABE ET AL	12-2000
6,174,661 B1	CHEN ET AL	1-2001

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-4 and 9-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawabe et al (6,159,656) (with Chen et al (6,174,661 B1) which is cited here to support the Examiner's position that "Florad FC430" and "FC431" are fluorinated alkyl esters).

Kawabe teaches a chemical amplification type positive resist composition suitable for exposure to far UV rays (220 nm or shorter wavelength) which comprises *a polymer*, *a solvent*, and at least one of a fluorine type surfactant and a silicon type surfactant (in Kawabe's Examples 1 and 2, "Megafac F176" (a fluorine type surfactant) is used). See col.3, lines 37-65, col.45, lines 55-56, and Table 1 in col.49-50. Kawabe also teaches (col.44, lines 64-67) that a nonionic surfactant can be further added for the purpose of improving the applicability of each photosensitive resin composition of his invention or improving developability. Therefore, based on this teaching, one of ordinary skill in the art would immediately envisage adding a nonionic surfactant to Kawabe's resist composition in order to improve the applicability of the photoresist composition and improve developability. None of the examples which Kawabe lists in col.45, lines 1-7 for his nonionic surfactant includes any fluorine substituent or a silicon-

containing substituent. Therefore, Kawabe teaches present non-ionic surfactant having neither a fluorine substituent nor a silicon-containing substituent.

With respect to present limitation as to the amount of the non-ionic surfactant (10-2000 ppm), Kawabe does not explicitly disclose the presently claimed amount. However, since Kawabe clearly teaches that the nonionic surfactant is being added for the purpose of *improving the applicability* of the photoresist composition and improving developability, it would have been obvious to one of ordinary skill in the art to optimize the amount of the nonionic surfactant in Kawabe's invention so as to obtain optimum result, i.e., optimum applicability and optimum developability of Kawabe's photoresist composition. It is also the Examiner's position that this optimized amount will be overlapping with present range of 10-2000 ppm because present invention is also trying to *improve the coating property* of its resist material by including in the resist material a nonionic surfactant having neither a fluorine substituent nor a silicon-containing substituent (in their arguments presented in Appellant's Brief, applicants clearly state that the nonionic surfactant having neither a fluorine substituent nor a silicon-containing substituent is used in the present invention to *improve poor coating properties*, to suppress the occurrences of micro bubbles in solution, and to lower the occurrences of a variety of defects causing the yield reduction in the device manufacturing step). Therefore, the prior art's teaching would render obvious present inventions of claims 1, 3, 17.

With respect to present claims 2, 4, and 18, Kawabe teaches (col.45, lines 1-7) only eight examples to choose from for his nonionic surfactant. Among those eight,

polyoxyethylene lauryl ether and polyoxyethylene stearyl ether are presently claimed *polyoxyalkylene alkyl ethers*, and polyoxyethylene octylphenyl ether and polyoxyethylene nonylphenyl ether are presently claimed *polyoxyalkylene aralkyl ethers*. Since there are only eight examples to choose from, one of ordinary skill in the art would immediately envisage using any one of polyoxyethylene lauryl ether, polyoxyethylene stearyl ether, polyoxyethylene octylphenyl ether, and polyoxyethylene nonylphenyl ether as Kawabe's nonionic surfactant. Therefore, the prior art's teaching would render obvious present inventions of claims 2, 4, and18.

Kawabe teaches (col.45, lines 51-58) that his photosensitive resin composition is applied on a substrate, and the coating film is subjected to pre-bake and then exposed to an exposure light having a wavelength of 220 nm or shorter through a given mask. The exposed film is subjected to post-exposure bake and then developed to obtain a satisfactory resist pattern. Therefore, Kawabe's teaching would render obvious present inventions of claims 13-16 (Kawabe's taught examples exemplify the resist film being exposed to ArF excimer laser (193 nm) light through a mask (col.50, lines 33-39), and the exposure light having a wavelength of 220 nm or less such as ArF excimer laser (193 nm) meets present limitation of a high energy radiation having a wavelength of less than 500 nm).

With respect to present claims 9 and 19, Kawabe uses Megafac F176 (fluorine type surfactant) in his Examples 1 and 2, and the prior art teaches equivalence of this surfactant to Florad FC430 and FC431 in col.43, lines 46-56. Since the prior art teaches equivalence of these compounds, it would have been obvious to one of

ordinary skill in the art to use Florad FC430 or FC431 in place of the Megafac F176 in Kawabe's Examples 1 and 2 with a reasonable expectation of achieving a positive photosensitive resin composition which shows excellent performances with respect to the residual film ratio, resist profile, resolution, and dry-etching resistance. Florad FC430 and FC431 are fluorinated alkyl esters as evidenced by Chen et al, col.7, lines 22-23. Therefore, Kawabe's teaching would render obvious present invention of claim 9.

With respect to present claim 10, Kawabe teaches that his fluorine type and/or silicon type surfactant is present preferably from 0.01 to 1 part by weight per 100 parts by weight of the composition of his invention (0.01-1 wt%). Since present range of 10 to 2,000 ppm converts to 0.001-0.2%, the prior art's range overlaps with present range and thus would render the present range *prima facie* obvious. In the case "where the [claimed] ranges overlap or lie inside ranges disclosed by the prior at," a *prima facie* case of obviousness would exist which may be overcome by a showing of unexpected results, In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). Therefore, the prior art's teaching would render obvious present invention of claim 10.

With respect to present claims 11, 12, and 20, Kawabe does not explicitly disclose the weight ratio of the non-ionic surfactant to the fluorine surfactant (although the prior art teaches the amount for the fluorine surfactant). However, since Kawabe teaches that the nonionic surfactant is being added for the purpose of improving the applicability of the photoresist composition and improving developability, it would have been obvious to one of ordinary skill in the art to optimize the amount of the nonionic

surfactant in Kawabe's invention so as to give optimum result, i.e., optimum applicability and optimum developability of Kawabe's photoresist composition. It is also the Examiner's position that this optimized amount will be overlapping with present range of 10-2000 ppm because present invention is also trying to *improve the coating property* of its resist material by including in the resist material a nonionic surfactant having neither a fluorine substituent nor a silicon-containing substituent. Therefore, since the prior art's range for the amount of the fluorine surfactant also overlaps with the present range for the amount of the fluorine surfactant (as discussed above), the weight ratio of Kawabe's non-ionic surfactant to Kawabe's fluorine surfactant will also be overlapping with present range of 0.1 or greater. Therefore, Kawabe's teaching would render obvious present inventions of claims 11, 12, and 20.

(11) Response to Argument

A. Appellant argues that claims 1-4, 9, 10, and 17-19 are not obvious in view of Kawabe et al in combination with Chen et al.

Appellant first refers to the non-final Office Action (Paper No. 13), which states that *since none of the examples which Kawabe lists in col.45, lines 1-7 for his non-ionic surfactant includes any fluorine substituent or a silicon-containing substituent, Kawabe teaches present non-ionic surfactant having neither a fluorine substituent nor a silicon-containing substituent.* Then, appellant argues that Kawabe is *silent* with respect to the composition of the non-ionic surfactant having neither a fluorine substituent nor a silicon-containing substituent, as disclosed in the present invention. Appellant argues that in view of the standards set forth under 35 U.S.C. 103, merely failing to discuss or

even acknowledge a non-ionic surfactant having neither a fluorine substituent nor a silicon-containing substituent clearly does not constitute a "teaching" or even a "suggestion" of a non-ionic surfactant having neither a fluorine substituent nor a silicon-containing substituent. Thus, appellant argues that Kawabe fails to teach or suggest the specific combination contributing to the resist material composition as recited in present claims 1 or 17.

Appellant seems to be arguing that the only way for Kawabe to teach or suggest present non-ionic surfactant comprising one or more non-ionic surfactants having neither a fluorine substituent nor a silicon-containing substituent is to *literally state* "a non-ionic surfactant comprising one or more non-ionic surfactants having neither a fluorine substituent nor a silicon-containing substituent." However, the fact that *none of the examples which Kawabe lists in col.45, lines 1-7 for his nonionic surfactant includes any fluorine substituent or silicon-containing substituent* is enough to conclude that Kawabe teaches present non-ionic surfactant having neither a fluorine substituent nor a silicon-containing substituent.

Appellant further argues that Kawabe fails to recognize the result-effective capability of the non-ionic surfactant. Appellant argues that the mere mention (of Kawabe) of the addition of a non-ionic surfactant for improving "applicability" or "developability" is not a substitute for the teaching of the present application providing specific combinations of specific chemical compounds with distinct chemical characteristics to provide distinct resist materials coupled with an appreciation of the effects of the present invention. Appellant argues that one of ordinary skill in the art

would not have been motivated to have optimized the amount of the non-ionic surfactant of Kawabe and certainly not, a non-ionic surfactant having neither a fluorine substituent nor a silicon-containing substituent in order to arrive at the present invention. Appellant furthermore argues that far more than routine skill is required to arrive at the present invention on the basis of Kawabe where specific result-effective variables, for examples, a non-ionic surfactant having neither a fluorine substituent nor a silicon-containing substituent, is provided only through the disclosure of the present application.

The Examiner disagrees. As explained in the non-final Office Action of Paper No.13, since Kawabe clearly teaches that the nonionic surfactant is being added for the purpose of improving the applicability of the photoresist composition and improving developability, it would have been obvious to one of ordinary skill in the art to optimize the amount of the nonionic surfactant in Kawabe's invention in order to obtain optimum results, i.e., optimum applicability and optimum developability of Kawabe's photoresist composition (one of ordinary skill in the art would have a reasonable expectation of success in incorporating an optimal amount of nonionic surfactant into the taught composition of Kawabe comprising a fluorine containing surfactant in order to optimize the applicability and developability of the taught composition). Also, this optimized amount will be overlapping with present range of 10-2000 ppm because present invention is also trying to improve the coating property of its resist material by including in the resist material a nonionic surfactant having neither a fluorine substituent nor a silicon-containing substituent. Given the broad range of 10-2000 ppm, and *in the*

absence of evidence of record which shows the unexpected superior results of using the present amount of the non-ionic surfactant having neither a fluorine substituent nor a silicon-containing substituent (none of the comparative examples in the present specification shows the criticality of the present range for the amount of the non-ionic surfactant), it is still the Examiner's position that it would have been obvious to one of ordinary skill in the art to optimize the amount of the nonionic surfactant in Kawabe's invention in order to obtain optimum results and that so-optimized amount will be overlapping with present range of 10-2000 ppm because present invention is also trying to improve the coating property of its resist material.

B. Appellant argues that claims 13-16 are not obvious in view of Kawabe et al in combination with Chen et al.

Appellant argues that the resist material of the present invention is not the same as, or comparable to the resin composition proposed by Kawabe for the same reasons stated above. Therefore, the Examiner believes that this argument is already addressed above.

C. Appellant argues that claims 11, 12, and 20 are not obvious in view of Kawabe et al. in combination with Chen et al.

Appellant again argues that Kawabe does not disclose a resist material comprising one or more surfactants having a fluorine substituent and between 10 and 2000 ppm of a non-ionic surfactant comprising one or more non-ionic surfactants having neither a fluorine substituent nor a silicon-containing substituent. Appellant argues that Kawabe merely mentions that a non-ionic surfactant can be added for the purpose of

improving applicability or developability and that neither the composition of the non-ionic surfactant nor the amount of the non-ionic surfactant of the present invention are taught or suggested by Kawabe. Appellant argues that one of ordinary skill in the art would not have been motivated to optimize the composition of the non-ionic surfactant or the amount of the non-ionic surfactant of Kawabe in order to obtain the resist material of the present invention.

The Examiner disagrees. Kawabe clearly teaches that a nonionic surfactant (*none of which examples includes a fluorine substituent nor a silicon-containing substituent*) can be further added to the taught photosensitive resin composition which comprises (A) a compound which generates an acid upon irradiation; (B) a polymer represented by formula (Ia-Id); (C) a nitrogen containing basic compound; and (D) at least one of a fluorine type surfactant and a silicon type surfactant (see abstract), thereby meeting the claim limitations of a combination of fluorine containing surfactant and a non-ionic surfactant having neither a fluorine substituent nor a silicon-containing substituent. Kawabe also teaches that the nonionic surfactant is added for the purpose of improving the applicability or developability of the taught resin composition. Therefore, as explained already, it would have been obvious to one of ordinary skill in the art to optimize the amount of the nonionic surfactant in Kawabe's invention so as to obtain optimum result, i.e., optimum applicability and optimum developability of Kawabe's photoresist composition, and that this optimized amount will be overlapping with present range of 10-2000 ppm because present invention is also trying to *improve the coating property* of its resist material.

D. Appellant argues that Examples 1-6 and Comparative Examples 1-6 of the present application further illustrate the nonobviousness of the present invention.

Appellant first refers to the non-final Office Action (Paper No.13) in which the Examiner states that "it would have been obvious to one of ordinary skill in the art to use Florad FC430 or FC431 (presently claimed fluorinated alkyl esters) in place of the Megafac F176 in Kawabe's Examples 1 and 2 with a reasonable expectation of achieving a positive photosensitive resin which shows excellent performances with respect to the residual film ratio, resist profile, resolution, and dry-etching resistance." Then, appellant argues that a review of the comparative examples reveals that merely substituting Florad FC430 in place of the Megafac F176 in Kawabe's examples does not provide a reasonable expectation of achieving the resist materials provided by the present invention. More specifically, appellant argues that FC430 was employed in Comparative Example 6 and demonstrates that a surfactant having a fluorine substituent without an addition of the non-ionic surfactant results in a large number of contaminants on the pattern surface and a large number of liquid particles.

It seems that Appellant misunderstood the Examiner's position. Before addressing present claims 9 and 19, the Examiner already established (with respect to present claims 1 and 17) that Kawabe teaches that a nonionic surfactant (which does not contain any fluorine substituent or a silicon-containing substituent) can be further added to his chemical amplification type positive resist composition containing a polymer, a solvent, and at least one of a fluorine type surfactant and a silicon type surfactant. Then, in addressing present claims 9 and 19, the Examiner explained that

since Kawabe uses Megafac F176 (a fluorine type surfactant) in his Examples 1 and 2, and since Kawabe teaches the equivalence of this surfactant to Florad FC430 and FC431, it would have been obvious to one of ordinary skill in the art to use Florad FC430 or FC431 in place of the Megafac F176 *as the fluorine type surfactant* in Kawabe's composition (*that also contains* a polymer, a solvent, and *a nonionic surfactant*). That is, the Examiner is not saying that it would have been obvious to one of ordinary skill in the art to obtain Kawabe's composition containing Florad FC430 or FC431 only, but saying that it would have been obvious to one of ordinary skill in the art to obtain Kawabe's composition containing Florad FC430 or FC431 as well as the nonionic surfactant.

E. Motivation to modify Kawabe et al. cannot be derived from applicants' specification.

Appellant argues that any motivation to modify Kawabe is derived from the disclosure in present specification. Since Kawabe merely proposes that a non-ionic surfactant can be further added to the photosensitive resin composition, appellant argues, Kawabe fails to teach or suggest the specific combination contributing to the resist material composition as recited in the present claims. Appellant argues that Kawabe fails to discuss a non-ionic surfactant having neither a fluorine substituent nor a silicon-containing substituent and that Kawabe is unclear with respect to the specific combination that results in the resin composition upon addition of the non-ionic surfactant. Appellant also argues that Kawabe fails to recognize specific result-effective variables, such as a non-ionic surfactant having neither a fluorine substituent nor a

silicon-containing substituent, that are provided only through the disclosure of the present application. Thus, appellant argues that neither the composition of the non-ionic surfactant nor the amount of the non-ionic surfactant of the present invention are taught or suggested by Kawabe and that Chen does not cure the deficiencies of Kawabe. Appellant finally argues that for the reasons stated, the recitations of the present claims are patentably distinct from the proposals of Kawabe, wherein the deficiencies of Kawabe are not cured by Chen.

The Examiner disagrees. As explained above, since Kawabe clearly teaches that a nonionic surfactant (*none of which examples includes a fluorine substituent nor a silicon-containing substituent*) can be further added to the taught photosensitive resin composition which comprises (A) a compound which generates an acid upon irradiation; (B) a polymer represented by formula (Ia-Id); (C) a nitrogen containing basic compound; and (D) at least one of a fluorine type surfactant and a silicon type surfactant, Kawabe's teaching meets the present claim limitations of a combination of fluorine containing surfactant and a non-ionic surfactant having neither a fluorine substituent nor a silicon-containing substituent. As also addressed above, the fact that *none of the examples which Kawabe lists in col.45, lines 1-7 for his nonionic surfactant includes any fluorine substituent or silicon-containing substituent* is enough to state that Kawabe teaches present non-ionic surfactant having neither a fluorine substituent nor a silicon-containing substituent. Finally, as already explained above, given the broad present range of 10-2000 ppm, and *in the absence of evidence of record which shows the unexpected superior results* of using the present amount of the non-ionic surfactant having neither a

fluorine substituent nor a silicon-containing substituent, it is still the Examiner's position that it would have been obvious to one of ordinary skill in the art to optimize the amount of the nonionic surfactant in Kawabe's invention in order to obtain optimum results (in terms of applicability and developability of Kawabe's photoresist composition) and that so-optimized amount will be overlapping with present range of 10-2000 ppm because present invention is also trying to improve the coating property of its resist material.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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